

EPA Report on the Leaching Behavior of AGREMAX  
EPA-600/R-12/724; December 2012

Summary:

AGREMAX is a combination of 80% coal fly ash and 20% bottom ash, which is mixed with water, compacted, allowed to cure for 7-14 days, then crushed into aggregate-sized pieces.

Region 2 sent AGREMAX samples to the ORD/RTP laboratory where their leaching potential was evaluated using Method 1313 (batch tests over pH 2-13) and Method 1314 (up-flow column test). Work was performed in accordance with an on-going ORD QAPP developed for CCR characterization work.

In assessing test results, Region 2 identified the relevant pH range as 6.5-11.5 and health reference values for each constituent of concern (COC) as the lower of: 1) the national drinking water MCL or 2) the EPA Region 9 residential tapwater regional screening levels (RSLs).

For each COC, the highest individual leach test result from each test that occurred between pH 6.5-11.5 was compared with the reference value for the COC.

For the two key COCs (As and Cr) the R9 screening levels are several orders of magnitude lower than the drinking water MCL values.

- For arsenic the MCL is at a risk level higher than 10<sup>-4</sup>, while the R9 level is a 10<sup>-6</sup> risk.
- For chromium, the MCL is based on non-cancer adverse effects, while the R9 level is based on new data indicating that Cr+6 is carcinogenic by ingestion, and at a 10<sup>-6</sup> risk.

The ratio of the test result to the reference value identifies the minimum dilution/attenuation factor (DAF) that would be needed to assure that the AGREMAX will not potentially contaminate a drinking water well with that COC above the designated screening threshold. In this comparison a higher ratio value implies a greater likelihood of well contamination by that COC. For comparison, the TC regulation relies uniformly on a national DAF of 100. In the revised CCR risk assessment (Table 4-15) national DAFs ranged from 7-40. Site-specific DAFs may be either higher or lower than these values.

	1313 Result	R9 Screen (ratio)	MCL (ratio)	1314 Result	R9 Screen (ratio)	MCL (ratio)
As	0.051 mg/l	0.000045 mg/l (1100)	0.010 mg/l (5.1)	0.043 mg/l	0.000045 mg/l (950)	0.010 mg/l (4.3)
Cr	0.015 mg/l	0.000031 mg/l (470)	0.10 mg/l (0.15)	0.28 mg/l	0.000031 mg/l (9000)	0.10 mg/l (2.8)

In basing the evaluation on the maximum leaching value and the R9 screening value for these

two COCs, this assessment must be considered to be a screening, or bounding assessment.

- No groundwater fate and transport modeling to estimate the potential to contaminate a near-by drinking water well was performed.

When compared with the draft beneficial use guidance, the AGREMAX assessment represents Step 4: Screening Assessment. Two differences in the details of the AGREMAX assessment are:

- in AGREMAX the maximum leach value was used, whereas the Ben Use draft relied on 90<sup>th</sup> percentile data; and
- AGREMAX relied on the more conservative R9 tapwater screening values rather than the MCLs and Drinking Water HBNs used in the draft Ben Use assessment.

#### AES Comments/Concerns:

The comments of AES on the EPA assessment (letter of Jan 10, 2013) make two basic arguments: 1) EPA's reference concentrations are inappropriate; and 2) the LEAF leach test results were used in a screening assessment that is not adequately site-specific.

Regarding AES' first concern, they argue that drinking water MCLs are the more appropriate reference concentrations for comparison.

- The basic argument for this view is that drinking water delivered for human consumption may contain COCs at concentrations up to the MCL values.
- The basic argument against this view is that use of waste materials should not be allowed to result in "dirtying-up" groundwater to the MCL values, which are based in part on the availability and cost of drinking water treatment technology nationally.

In expressing their second concern, AES identifies several aspects of the assessment to which they object, and which can be summarized as making the assessment too generic and not site specific (although they do not argue it in exactly this way). AES makes the following assertions in their comments:

- In the column test (which uses DI water) the pH remained between 10 and 11, narrower than the pH range of 6.5-11.5 used for the data selected for comparison with the reference values. They argue the pH6.5-11.5 range is unrealistic.
- The report does not do groundwater fate and transport modeling, which would include the dilution/attenuation that would occur before an actual exposure.
- The report compares only the maximum leach test results with the reference values, and not the full range of results.
- The report selects test results from the low liquid/solid ratio data, which they believe biases the results high.

AES provides their own calculation based on the LEAF data and incorporating all their own comments as they believe the Agency should, and arrive at ratios that are almost uniformly less than 1.